REMARKS/ARGUMENTS

The Examiner is thanked for the Office Action mailed April 30, 2007. The status of the application is as follows:

- Claims 1-20 are pending. Claims 1-7 have been amended herein. Claims 8-20 have been added.

- Claims 3 and 4 are objected to for depending on a rejected base claim.

- Claim 4 is objected to for informalities.

- Claims 1-2 and 5-7 are rejected under 35 U.S.C. 112, second paragraph.

- Claims 1 and 6-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Harding et al. (US 2002/0150202 A1).

- Claims 2 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harding et al. in view of Grass et al. (US 2001/0038678 A1).

The objections and rejections are discussed below.

The Objection to Claims 3 and 4

The Examiner is thanked for indicating that claims 3 and 4 would be allowable if rewritten to include all the limitations of the base claim and any intervening claims. Applicant reserves the right to rewrite claims 3 and 4 at a later time if desired.

The Objection to Claim 6

The Office has objected to claim 4 for including an extraneous parenthesis and for a redundant reference to claim 1. Applicant believes that the Office meant to refer to claim 6 since claim 4 does not include an extraneous parenthesis or a redundant reference to claim 1 and claim 6 includes both. Claim 6 has been amended herein to remove the

extraneous parenthesis and the redundant reference to claim 1. Accordingly, this rejection should be withdrawn.

The Rejection of Claims 1-2 and 5-7 under 35 U.S.C. 112, Second Paragraph

Claims 1-2 and 5-7 stand rejected under 35 U.S.C. 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The Office states that claims 1, 6, and 7 recite limitations that are confusing and indefinite as they imply that the examination zone is rotated about the axis of rotation. Claims 1, 6, and 7 have been amended herein to clarify that the examination zone is not rotated. Accordingly, the rejection of claims 1, 6, and 7 should be withdrawn.

The Office has rejected claims 3 and 4 by virtue of their dependency from claim 1. In view of the above, the rejection of claims 3 and 4 should be withdrawn.

The Office states that claims 2 and 5 include limitations directed towards rays having a curved shape. The Office asserts that this is confusing and indefinite since rays travel in straight lines. Applicant traverses this rejection. Claim 2 does not require the rays of the radiation beam generated by the radiation source to travel along any particularly shaped path – straight, curved or other. Rather, claim 2 recites that the back projection performed during reconstruction is performed in a volume along rays having a curved shape. As described at least on page 8, line 12, to page 9, line 6, the back projection step may be performed in a volume in which the originally linear path of the rays is curved and, thereby, the back projection takes place along curved rays. Figure 8 shows an example in which the path of the rays in the volume is curved along a hyperbola. Thus, claim 2 is not indefinite. Claim 5 does not include the term "curved" as asserted by the Office Therefore, the rejection of claims 2 and 5 should be withdrawn.

The Rejection of Claims 1, 6, and 7 under 35 U.S.C. 102(b)

Claims 1, 6, and 7 stand rejected under 35 U.S.C. 102(b) as being anticipated by Harding et al. This rejection should be withdrawn because Harding et al. does not teach each and every element as set forth in the subject claims and, therefore, does not anticipate claims 1, 6, and 7.

> A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987). MPEP §2131.

Claim 1 is directed to a computed tomography method and recites, *inter alia*, reconstructing a CT image of the examination zone from the measuring values, during which reconstruction a back projection is carried out in a volume which is defined by two linearly independent vectors of the rotational plane and a wave vector transfer. **Claims 6 and 7** recite similar aspects. In rejecting claim 1, the Office Action asserts that Harding *et al.* teaches the above claimed aspects in paragraphs [0004], [0023], and [0032]. However, the referenced sections of Harding et al. do not teach or suggest these claimed aspects.

Harding et al. relates to a computed tomography apparatus that includes a modulation unit, disposed between a radiation source and an examination zone, that temporally and spatially modulates a primary fan beam in a manner to reduce reconstruction artifact resulting from segments of the primary fan beam that diverge in the direction of the source. (See Abstract). Harding et al. discloses that this is accomplished by modulating the radiation beam such that the coherent scattered radiation incident on the individual detector elements from each segment of the primary radiation enables determination of the momentum transfer by correlation of the measured detector signal with the modulation signal used to modulate the radiation. (See page 1, paragraphs [0005] and [0006]).

Paragraph [0004] of Harding et al. is directed towards reconstructing the momentum transfer (not a CT image) via an iterative algebraic reconstruction technique to obtain the momentum transfer spectrum. In paragraph [0004], Harding et al. discloses that for each voxel in the examination zone that is traversed by a primary beam such a reconstruction yields the momentum transfer spectrum, which represents the intensity of the scattered radiation as a function of the momentum transfer.

Paragraph [0032] of Harding et al. is also directed towards reconstructing the momentum transfer to obtain the momentum transfer spectrum. In paragraph [0023], Harding et al. discloses that the momentum transfer spectrum is reconstructed from the momentum transfer as a function of the location u, v (which are coordinates in a plane parallel to and within the examination zone). Harding et al. further discloses that the momentum transfer is the product of the energy of the scattered X-ray quanta and the sine of half the scatter angle and, hence, the scatter angle and the energy of the scattered X-ray quantum must be known in order to obtain the momentum transfer spectrum. Harding et al. further discloses that the scatter angle is given by the position of the detector element and the position of the point in the primary fan beam where the scatter occurs, and that the energy of the scattered X-ray quanta is either measured or the X-ray source must produce near monochromatic X-rays, or X-rays with energies from a small energy range.

In paragraph [0023], Harding et al. discloses using an image processing computer to process measuring data acquired by a detector to reconstruct an image or evaluate the measuring data in another manner and displaying such data on a display screen. However, paragraph [0023] of Harding et al. is silent with respect to any particular technique for reconstructing the images.

In light of the above, Harding et al. teaches a technique for obtaining the momentum transfer spectrum by reconstructing the momentum transfer and does not teach or suggest reconstructing a CT image of the examination zone from the measuring values by back projecting in a volume defined by two linearly independent vectors of the

rotational plane and a wave vector transfer as recited in claim 1. Therefore, applicants respectfully request withdrawal of this rejection and allowance of claims 1, 6, and 7.

The Rejection of Claims 2 and 5 under 35 U.S.C. 103(a)

Claims 2 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harding et al. in view of Grass et al. This rejection should be withdrawn because the combination of Harding et al. and Grass et al. does not teach or suggest all of the limitations of the subject claims and, hence, fails to establish a *prima facie* case of obviousness with respect to claims 2 and 5.

> To establish a *prima facie* case of obviousness, ... the prior art reference (or references when combined) must teach or suggest all the claim limitations. MPEP §2143.

Claim 2, which depends from claim 1, recites that the back projection during the reconstruction is performed along rays having a curved shape. The Office asserts that such aspects are taught in Figure 6 and paragraphs [0041] and [0042] of Grass et al. However, these sections of Grass et al. do not relate to back projecting along curved paths during reconstruction. Rather, Figure 6 and paragraphs [0041] and [0042] of Grass et al. relate to the trajectory of rays from the x-ray source to the detector. As disclosed in the Abstract, Grass et al. is directed towards irradiating an examination zone via two different trajectories that are offset from each other by a distance wherein neither trajectory completely irradiates the region between the trajectories but the data from both trajectories can be combined to reconstruct this region without loss of image quality.

Paragraph [0041] discloses that when the detector defines an arc of a circle, the projection of the trajectory on the detector for a trajectory that is offset from the central line of the detector is curved. (See Fig. 4, projections $b2_1$, $b2_0$, and $b2_2$). Paragraph [0042] discloses that the distance between the trajectories and, thus, the projections on the detector can be selected so that the region between the trajectories can be

reconstructed. Fig. 6 simply shows fan beams formed in parallel planes via rebinning. In view of the above, it is readily apparent that the reference sections of Grass et al. do not teach or suggest back projecting, during reconstruction, along rays having a curved shape as recited in claim 2. Accordingly, this rejection should be withdrawn.

Claim 5 depends from claim 1 and is allowable at least by virtue of this dependency.

Newly Added claims 8-20

Claim 8, which depends from independent claim 7, includes aspects of allowable claim 3. Accordingly, claim 8 should be allowed.

Claims 9, 10, and 11, which directly or indirectly depend from claim 1, respectively recite: 1) the wave vector transfer is a function of a first distance between a detector element and a foot of the detector unit, a second distance between a scatter center and the foot of the detector unit, an inverse wavelength of the coherently scattered radiation; 2) the wave vector transfer is not a function of a scatter angle, and 3) the wave vector transfer is a function of $A/(2D\lambda)$ and A represents a distance between a detector element and a foot of the detector unit, D represents a distance between a scatter center and the foot of the detector unit, and λ represents the wavelength of the coherently scattered radiation.

As noted in the instant application, with one conventional reconstruction technique based on back projection, a relatively large distance may exist or be assumed between the examination zone and the detector unit, and, thus, the relationship between the point of incidence of a scattered ray on the detector unit and the scatter angle may be ambiguous and, as a result, the back projection may produce inaccurate results. (See page 1, lines 8-20). As described on page 8, line 12, to page 9, line 6, in the instant application, a non-limiting back projection is based on a distance between a detector element and a foot of the detector unit, a distance between a scatter center and the foot of

the detector unit, and an inverse wavelength of the coherently scattered radiation. Such a back projection allows a faster reconstruction that takes into account the scan geometry. (See page 1, line 23, to page 2, line 24. These aspects, which are included in claims 9-11, are absent from the art of record and, therefore, entry and allowance of claims 9-11 is kindly requested.

Claim 12 (and **claims 13 and 14**, which depend therefrom), includes aspects related to back projecting during reconstruction in a volume along rays having a curved shape. As discussed above in connection with claim 2 above, Harding et al. and Grass et al., individually and in combination, do not teach or suggest back projecting during reconstruction in a volume along rays having a curved shape. **Claim 15**, which depends from claim 11, includes aspects from allowable claim 8. In view of the above, entry and allowance of claims 12-15 is also kindly requested.

Claim 16, which is directed towards a computed tomography system, includes a reconstructor that reconstructs measuring values indicative of the detected radiation, wherein the reconstructor back projects the measuring values in a volume as a function of a wave vector transfer that varies based on a difference between a scatter center and a foot of the detector. Such aspects are not taught or fairly suggested in the art of record. **Claims 17-20**, which directly or indirectly depend from claim 16, include aspects related to subject matter absent from the art of record, as noted above, and subject matter deemed allowable in the Office Action. Accordingly, entry and allowance of claims 16-20 is kindly requested.

Conclusion

In view of the foregoing, it is submitted that the claims distinguish patentably and non-obviously over the prior art of record. An early indication of allowability is earnestly solicited.

Respectfully submitted,

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